CHAPTER 11
PRESENTATION OF EQUIPMENT
LESSON PLAN 11

METHOD:

Lecture, conference, and demonstration

TIME ALLOTTED:

1.5 hours

COURSE PRESENTED TO:

a. Instructors
b. Unit NCOs
c. TSC personnel

TOOLS, EQUIPMENT, AND MATERIALS (per student):

a. Student handout
b. TM 9-6920-709-12&P-1-2
c. TM 9-6920-711-12&P-1

PERSONNEL:

a. Primary instructor
b. Assistant instructor

INSTRUCTIONAL AIDS:

a. Overhead projector
b. Viewgraphs (Appendix A)

REFERENCES:

a. TM 9-6920-709-12&P-1-2
b. TM 9-6920-711-12&P-1
c. Student handout of lesson plan

APPENDICES:

Appendix A. Viewgraphs
Appendix B. Student Handout

11-1. INTRODUCTION. (5 minutes)

Note. Show Slide 1.

a. **Reason.** To be able to teach, instruct, and assist crews using TWGSS, the instructor must have an in-depth knowledge of the operation, function, and capabilities of TWGSS and its components.

Note. Show Slide 2.

b. **Training Objective.** In a classroom environment, given a student handout and TM 9-6920-709-12&P-1-2 and TM 9-6920-711-12&P-1, you will become familiar with the function and capabilities of TWGSS and its components.

c. **Procedure.** During this block of instruction we will discuss the functions and capabilities of TWGSS and its components.

11-2. LECTURE/CONFERENCE/DEMONSTRATION. (80 minutes)

Note. Show Slide 3.

a. **TWGSS Design.** The TWGSS training system consists of two parts: the TWGSS simulator, consisting of components that are mounted to the M1A2 tank and the Training Data Retrieval System (TDRS), consisting of a computer unit and software used to set up and evaluate TWGSS training.

(1) **TWGSS simulator.** The TWGSS simulator can be divided into two sub-systems: firing system (FS) and target system (TS). The firing system performs the simulations of main gun and coax firing. The target system performs the simulations of the effect of an ammunition impact on the tank. Some of the components that make up the TWGSS simulator are used both by FS and TS.

(2) **TDRS.** The TDRS contains a laptop computer with software to set up exercises with training data and evaluate and store data collected during TWGSS training. Data is transferred between simulator and computer by the TDRS memory card.

Note. Show Slide 4.

(3) **Major components of firing system.**

(a) Transceiver unit. The transceiver unit performs the ballistic calculations and all the transmissions/receptions of coded laser pulses needed to complete a simulation.

(b) Tracer, burst, obscuration simulator (TBOS) system. Simulates visual effects of firing in the various sights of the M1.

11-2. LECTURE/CONFERENCE/DEMONSTRATION (Con't).

Note. Show Slide 5.

(4) **Major components target system.** This system performs the target simulation for a vehicle under attack by TWGSS/PGS or MILES firing vehicles. It simulates the target outline and vulnerability of the vehicle it simulates. The TS consists of:

(a) Target computer unit
(b) Retro detector units (4)
(c) Hull defilade detector units (4)

Note. Show Slide 6.

(5) **Common components.** The following components are common to both firing and target systems:

(a) Remote System Interface (RSI) Assembly. This assembly stores data on vehicle position and provides system time monitoring/updating to TWGSS.
(b) Vehicle interface assembly. This assembly monitors and injects signals into the tank to allow the crew to perform normal gunnery procedures with a simulator. Both firing and target systems use the vehicle interface assembly during simulation.
(c) Operator interface. The control panel is the operator interface between TWGSS and the crew. The control panel allows the downloading of TWGSS training parameters and storage of training data collected during the training exercise. Both FS and TS data is presented and stored.
(d) Turret position sensor. This component registers turret/hull relation for firing and target results.

Note. Show Slide 7.

(6) **System bus.** Major components in TWGSS are linked together on a high-speed data bus called Controller Area Network (CAN). This link is similar to the 1553 link used in the M1A2. The high-speed data bus is used for communication between components within the system and to distribute power to all TWGSS components. The data bus connects to transceiver unit, TBOS driver unit, target computer unit, TBOS video mixer unit, vehicle interface unit, and control panel.

Note. Show Slide 8.

b. **Transceiver Unit.** The transceiver unit uses conditionally eye-safe laser transmitters for the simulation of projectiles. The laser transmitters use laser light compatible with the lasers used by MILES. TWGSS simulates projectiles in real time and with the correct ballistics and dynamics of real ammunition. The transceiver unit performs the simulation

of projectiles based on firing tables for combat ammunition, thereby enabling precision gunnery.

Note. Show Slide 9.

(1) **Functional principle of laser light simulation.** Laser light cannot replicate the curved trajectory of a projectile due to the fact that is much faster and does not travel in a curved trajectory. In order to use laser light to simulate a projectile, the transceiver unit must combine ballistic calculation, laser light transmission and reception, and gyrostabilization into a simulation of a fired projectile.

(a) The transceiver unit performs the complete ballistic simulation. The computer inside of the transceiver unit calculates the position of the projectile it simulates continuously throughout the flight path. The simulation of the projectile is in real time and according to firing table data.

(b) In order to use laser light to simulate a curved projectile, the system continuously transmits pulses around the position where the simulated projectile is located during its trajectory. Each pulse is transmitted and evaluated for received reflections. The system scans the pulses around the position of the projectile.

(c) Targets used during TWGSS training must be equipped with retro detector or reflector units in order for the transceiver unit to determine an impact point on the target.

Note. Show Slide 10.

(2) **Flying volume.**

(a) The transceiver unit contains laser transmitters that send out laser pulses that are shaped as long narrow lobes. These laser pulses are transmitted continuously during simulation to detect targets. By combining scanning, transmission, and reception of laser lobe pulses, a flying volume is created around the simulated projectile. The flying volume is simulated with the same ballistics as the actual projectile. The reference used for simulation is the direction of the gun barrel at the instance of the simulated round leaving the muzzle.

Note. Show Slide 11.

(b) The flying volume is moved forward with the speed of the simulated projectile. Laser pulses are scanned around where the round is positioned in the air. Only laser pulses reflected from targets positioned within the

flying volume are accepted by the transceiver unit. 50,000 pulses can be sent out during a simulation to detect targets. Each pulse transmitted is evaluated for a returned reflection from a target within the flying volume.

Note. Show Slide 12.

(3) **Gyro stabilization.**

(a) The flying volume is stabilized during simulation by the gyros of the transceiver unit. This enables fire on-the-move or movement of the gun barrel during simulation without the projectile following the gun barrel movement.

(b) The same gyro compensates for cant angle if the round is fired with the vehicle positioned with cant. This will enable the round to drop correctly in relation to the ground plane.

Note. Show Slide 13.

(4) **Impact point determination.**

(a) Impact point determination occurs when the flying volume (simulated projectile) has reached the retro reflector-equipped target and reflections from the target are detected by the transceiver unit. These reflections are used to determine the simulated projectile's impact in relation to the retro reflector.

(b) The system uses three lasers shaped like narrow, long beams. The beams are used (through scanning) to determine where the retro reflector-equipped target is positioned in relation to the simulated round.

(c) The information of where the simulated round will impact together with the ammunition type fired and identity of firing vehicle is transmitted to the target by the transceiver unit when impact point determination is in progress.

(d) Impact point and ammunition type information enable the target system to perform an independent evaluation of the round impact effect. This evaluation is based upon pre-programmed target system data like vehicle type, size, outline, and vulnerability.

Note. The firing system cannot distinguish between target vehicle types. The firing system only calculates the impact point in relation to the retro detector/reflector and transmits the impact point and ammunition type to the retro reflector.

Note. Show Slide 14.

11-2. LECTURE/CONFERENCE/DEMONSTRATION (Con't).

(5) **Engagement results.**

(a) The transceiver unit evaluates the firing system engagement by comparing the determined impact result with a template. If the impact is within the template, the simulation is stopped and the result of the engagement is presented. If the impact is outside the template, the simulation continues in search of other targets.

(b) The fired upon target system, based upon the received impact point and ammunition type, calculates the effect on the target vehicle. This is done independently of the firing system's evaluation. The correct vehicle impact result during a during a force-on-force exercise is found in the target system.

Note. Show Slide 15.

(6) **Ballistic simulation.** The transceiver unit performs the ballistic simulation and calculation of round impact based on firing table data. The following firing table data is used for the simulation:

(a) Ballistic trajectory, velocity and time of flight. These round out to 3750 m for the main gun and 900 m for coax.

(b) Ammunition and air temperature. The simulation is based on an ammunition temperature of 69.8° F and air temperature of 59° F.

(c) Barometric pressure. The barometric pressure used with TWGSS is 29.92 in. of mercury.

(d) TWGSS system accuracy. TWGSS is system accurate within ±0.2 mils. If desired, the trainer can program an ammunition dispersion of ±0.3 mils. for main gun and ±1.0 mils. for coax.

Note. Show Slide 16.

(e) Subdes and CCFs for GCDP. TWGSS uses a "Fleet Zero" for M1A2. Normally, coax is individually zeroed; during TWGSS training, coax ZERO values are set to AZ 0.0, EL 0.0.

Note. Show Slide 17.

(7) **Information transmission to target systems.** The firing system transmits information to the target system. This information is used by the target system to calculate the impact point and the effect of a round on the target. The following information is transmitted:

(a) Hit position in elevation and azimuth. This is used by the TWGSS target system to determine impact point in the target.
(b) Ammunition type fired. This is used by the TWGSS target system in the calculation of impact effect.
(c) Player identification. This is stored by the target system and is used for result pairing during the AAR.

Notes. 1. The MILES information is transmitted at the impact point of the simulated round.
2. The MILES information is sent at the aiming point used for targets that are not equipped with a retro reflector. The MILES transmission is performed after the completed firing simulation.

(d) MILES. The transceiver unit transmits MILES firing information after a completed TWGSS simulation in order for LTIDs and MILES target systems to function.

Note. Show Slide 18.

(8) **Transceiver unit mounting in gun barrel.**

(a) Protection. The unit is mounted inside the gun tube for protection against dirt and damage. The unit is sealed and protected against vibration and shock.
(b) Transceiver unit position. Because the transceiver unit is mounted in the muzzle of the gun, it is able to pick up gun/sight misalignment at the moment of trigger pull. These misalignments normally occur due to vibration when firing on the move over rough terrain.
(c) Misalignment of gun/sight relationship. The simulation will be affected by crew-induced errors such as incorrect boresighting. This requires the crew to correctly perform the prepare-to-fire and boresighting procedures.
(d) Gun tube bending (MRS update). The mounting of the transceiver unit allows it to sense any gun/sight misalignments due to thermal bending. This requires the crew to perform regular MRS updates.
(e) Mechanical play between sight and gun. Mechanical or electrical errors within the FCS will show up as errors in the result of the simulation.

Note. Show Slide 19.

c. **Tracer, Burst, Obscuration Simulator (TBOS) System.** The TBOS system simulates the effects of rounds fired with main gun and coax.

(1) **TBOS effects.** The TBOS effects are presented in the GAS and GPS day and thermal modes. The following effects are presented:

11-2. LECTURE/CONFERENCE/DEMONSTRATION (Con't).

(a) Tracer simulation. Tracer effects are simulated in all sights with realistic burn times and zooming effects. The tracer effects can be switched off.

(b) Burst simulation. Burst on target and burst on ground are simulated. The size is dependent on ammunition type and on the range to the impact. Ground burst effects are smaller than burst on target effects. Burst effects can be switched off.

(c) Obscuration simulation. Obscuration is simulated for main gun firing only. The instructor can program the obscuration time from 0-5 seconds.

Note. Show Slide 20.

(2) **Tracer template.** The visual effects of the TBOS simulation are controlled by a template. The template sizes used are the T80 frontal for main gun rounds and a kneeling soldier for coax. The following happens with TBOS effects when firing in the different template areas:

(a) Area A. If area A is hit, simulation is stopped. A burst on target indication is given. Burst on target indication is bigger than burst on ground indication.

(b) Area B. If area B is hit, simulation is stopped prior to reaching the target and burst on ground indication is given at the impact point between projectile and a simulated ground plane.

(c) Area C. If area C is hit, simulation continues until the simulated projectile reaches maximum simulated range (if this happens prior to a ground hit) or hits the simulated ground plane.

(d) Area D. If area D is hit, the tracer simulation stops at the top of the template or the simulation continues (with the tracer simulation switched off) until the ammunition reaches maximum range simulated or the simulated ground plane.

Note. Show Slide 21.

(3) **TBOS GAS system design.** The block diagram shows how the TBOS GAS assembly is connected to the TBOS driver unit, which is connected between transceiver unit and target computer unit through the high-speed serial link CAN.

Note. Show Slide 22.

(a) TBOS GAS components. The TBOS driver unit initiates the TBOS simulation and the TBOS GAS assembly presents TBOS effects through a semi-transparent mirror in the GAS field of view.

Note. Show Slide 23.

11-2. LECTURE/CONFERENCE/DEMONSTRATION (Con't).

(b) Installation of TBOS GAS components. The components for the TBOS GAS are externally installed on the tank. The TBOS driver unit is installed on the gun mantle and the TBOS GAS assembly is installed inside of gun mantle in front of the auxiliary sight optical port.

Note. Show Slide 24.

(4) **TBOS GPS system design.** The block diagram shows the TBOS junction box connected to TIS J2 and TBOS video mixer unit. The TBOS video mixer unit is also connected to the rest of TWGSS through the CAN link.

Note. Show Slide 25.

(a) TBOS GPS components. The TBOS junction box feeds sight signals from the ICU to the TBOS video mixer unit. The TBOS video mixer unit modifies these signals to produce TBOS effects. These modified signals are then routed back to the ICU through the TBOS junction box to produce the desired visual effect. The TBOS effects are produced both in day and thermal modes.

Note. Show Slide 26.

(b) Installation of TBOS GPS components. The components for the TBOS GPS are installed inside the tank. The TBOS junction box is installed on the right-hand side of the GPS sight. The TBOS video mixer unit is located inside the .50 cal ammunition box. A cable which contains sight signals is routed between the TBOS video mixer unit and the TBOS junction box.

Note. Show Slide 27.

d. **Target System.** The target system determines if a projectile hits or misses the target. If the target is hit, the system simulates the effect the projectile would have on the vehicle. The effect of the round is indicated with strobe lights and sound cues in the intercom. Each round fired at the target is individually evaluated. Accumulative effects, of firing in the same area of a target, are not considered during target system evaluation.

Note. Show Slide 28.

(1) **System design of target system.** The block diagram shows the connections of retro detector units (RDUs) and hull defilade detector units (HDDUs) to the target computer unit (TCU). The TCU is connected to TWGSS through the CAN link.

11-2. LECTURE/CONFERENCE/DEMONSTRATION (Con't).

Note. Show Slide 29.

(2) **Target system main functions.**

(a) Receive information. The target system receives information from TWGSS/PGS- or MILES-equipped vehicles. The target system also receives information from control guns (CGUNs).

(b) Determine angle of attack. The target system is equipped with 8 detectors which are used to define 12 sectors. Each sector is 30°, providing a total of 360° coverage. Each of these 12 sectors replicates the target's outline, size, and vulnerability.

(c) Determine MISS/HIT. The target system determines HIT or MISS based upon received hit coordinates and target aspect angle.

(d) Determine MOBILITY KILL/WEAPON KILL. If the vehicle is assessed as HIT, the target system determines if a MOBILITY KILL or WEAPON KILL has occurred. The type of kill is based upon the actual impact point of the round on the target (suspension/track or weapon components).

(e) Determine catastrophic KILL. If the vehicle is HIT (not MOBILITY KILL or WEAPON KILL) the probability of kill is assessed based upon vulnerability data. A random generator is used to determine if tank is KILL or only considered hit. The higher the kill probability the higher the chance to be killed.

(f) Indicate the effect. The effect of the round impact is indicated to the firing vehicle through the strobe lights of the target vehicle's retro detector units. The effect is indicated to the crew in the target vehicle through the sound cues in the intercom.

Note. Show Slide 30.

(3) **Information received by target system.** The target system can receive information from laser-based simulators (TWGSS, PGS, CGUN, and MILES). The following information can be received:

(a) Hit coordinates. TWGSS receives hit positions in azimuth and elevation from other TWGSS or PGS systems. The hit coordinate is in relation to the retro reflector. The aspect angle of the attack is determined by the detector that received the coded message.

(b) Type of ammunition fired. TWGSS transmits the type of ammunition fired to allow the target system to make an assessment of the hit/kill probability at the impact point.

(c) Identity of attacking system. The identity of the attacker is also sent to the target system and stored together with the target simulation results. This provides target pairing during AAR.

(d) MILES information. If the attacker is a MILES-equipped vehicle, the ammunition type identity and effect of the simulation is indicated and stored by the target system.

Note: The MILES information received is IAW Enhanced Code Structure.

(e) Control Gun (CGUN) information. Instructors using the CGUN can transmit information to TWGSS target systems. This allows the Controller to reload, reset, kill, and test vehicles during TWGSS training.

Note. Show Slide 31.

(4) **Tamper indications.** The system senses, indicates, and stores any attempts to tamper with TWGSS. Tamper is indicated on the control panel, with strobe lights, and on the TDRS memory card. The following tamper attempts are indicated and stored:

(a) Disconnection of retro detector units. If a RDU cable is disconnected, tamper is indicated. The crew has 30 seconds to reconnect before KILL is indicated.

(b) Disconnection of hull defilade detector units. If an HDDU cable is disconnected, tamper is indicated. The crew has 30 seconds to reconnect before KILL is indicated.

(c) Disconnection of power. The system stores every powerup on the TDRS memory card. This indicates to the instructor during the AAR that the tank or TWGSS system was switched off during training.

(d) Alteration of control panel functions. If ammunition or other training parameters have been altered, it will be identified during the AAR.

(e) Disconnection of system cables. Any cables disconnected within the system will be stored as BIT errors on the TDRS memory card.

(f) Removal of TDRS memory card. If the TDRS memory card is removed and reinserted, this will be noted on the TDRS memory card.

Note. Show Slide 32.

(5) **Target system template.** The target system uses a template to determine Hit/Miss and target vulnerability. The template is programmed to accurately resemble vehicle's size and vulnerability for each of the ammunition types.

11-2. LECTURE/CONFERENCE/DEMONSTRATION (Con't).

e. **RSI Assembly.** The RSI interfaces between TWGSS and the global positioning sensor (GPS).

Note. Show Slide 33.

(1) **RSI position.** The RSI is connected between the target computer unit and the TBOS driver unit. The antenna for the RSI is connected to the RSI assembly.

Note. Show Slide 34.

(2) **RSI main functions.**

(a) Position defemination. The RSI determines the position of each TWGSS in an exercise. Every 50 m of movement is logged and stored on the TDRS memory card for AAR. Each event is stored with position data. The RSI is required to determine TWGSS position within a 50 m radius of actual.

(b) System time. The RSI receives the actual time from the satellite and adjusts the TWGSS clock as necessary. This ensures that all systems in the exercise use the same time to time tag training events. This simplifies result pairing during AAR.

Note. Show Slide 35.

(3) **RSI system components.** The RSI system consists of:

(a) RSI assembly. This assembly determines vehicle position.

(b) GPS antenna. This antenna receives signals from the satellite.

f. **Vehicle Interface Assembly.** The vehicle interface assembly consists of components used by both firing system and target system.

Note. Show Slide 36.

(1) **Vehicle interface assembly system design.** The block diagram shows the connections between TWGSS and the M1A2 tank. TWGSS connects to the tank FCEU connectors TJ2 and J2 for range and super elevation signals. TWGSS also reads information, such as weapon selected, cant angle, etc., from the 1553 data bus primary and alternate data bus coupler. TWGSS is connected to the blasting machine for the trigger signal and to the radio for the introduction of audio cues into the intercom. TWGSS also distributes the required signals for the Improved Tank Gunfire Simulator (ITGS) (Hoffman Device) to operate. The interface between TWGSS and the tank is performed by the expansion unit which injects/receives signals between the tank and TWGSS. Vehicle status is sent between the expansion unit and the vehicle interface unit. The vehicle interface unit distributes information to other TWGSS components using the CAN link.

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Note. Show Slide 37.

(2) **Vehicle interface assembly main functions.** The vehicle interface assembly is the link between TWGSS and the tank. The main function of this interface is:

(a) Receive and distribute power. The vehicle interface unit receives 24 volts from the tank which is converted, stabilized, and distributed to all TWGSS components.

(b) Monitor and inject signals to and from FCS. TWGSS is interfaced with the FCS through the TNB, LOS, and CEU. The simulator sends and receives signals to the tank through these connections via the vehicle interface.

(c) Monitor weapon status for AAR. Some tank signals are stored for use with the AAR. Some of these signals are ammo loaded, ammo fired, range in FCS.

(d) Register turret/hull relationship. The tank stores the turret/hull relationship through the turret position sensor (TPS). This information is used for target simulation and AAR.

(e) Inject sound into the tank intercom. The vehicle interface unit injects sound cues to simulate various tank functions as well as target system indications.

(f) Distribute vehicle status. The vehicle interface unit distributes vehicle FCS status to other TWGSS components.

(3) **Vehicle interface main components.** The main components of the vehicle interface consist of:

Note. Show Slide 38.

(a) Vehicle interface unit. This unit receives power from the tank and provides power to TWGSS. It communicates vehicle status with the expansion unit and other TWGSS components.

Note. Show Slide 39.

(b) Expansion unit. This unit monitors and processes the interface signals to and from the tank. It communicates with the 1553 data bus and FCEU for vehicle status.

Note. Show Slide 40.

(c) Loader's panel. This component initiates the loading sequence and injects sound cues into the intercom.

(d) W11 cable and LRF node assembly. The W11 cable contains a system bus (similar to 1553 bus) and the connections necessary to the tank and LRF node assembly. The TJ2 connector is an independent component equipped with a processor, system program, and all interface electronics needed to interface with the tank. This makes the interface to the tank safer and more secure from electrical disturbances. The LRF node assembly is an independent component that connects to the W11 cable data bus. The LRF node assembly is equipped with a processor, system program, and all interface electronics needed to interface to the tank's LRF.

Note. Show Slide 41.

(4) **Installation of vehicle interface.** The vehicle interface unit and expansion unit are positioned in the .50 cal. ammunition box. The loader's panel is positioned on the turret support beam within reach of the loader.

Note. Show Slide 42.

g. **Operator Interface.** TWGSS is operated through the control panel. The control panel uses four pushbuttons to operate menus containing all the functions needed to align, test, and train with TWGSS.

Note. Show Slide 43.

(1) **Control panel main functions.**

(a) Crew/instructor interface. The control panel interfaces the crew and/or the instructor with TWGSS.

(b) Setup of system. The TDRS memory card downloads application-specific data such as ballistics, parallaxes, target templates, etc. at system startup.

(c) Defines training parameters. Training data such as training mode, ammunition allowances, obscuration time, etc. is defined on the TDRS memory card. The TDRS data is programmed by the instructor prior to training and downloaded into the system during powerup.

(d) Stores training events. The TDRS memory card stores training events for the After Action Review (AAR). The AAR can be presented to the crew using the TDRS computer unit.

Note. Show Slide 44.

(2) **Control panel crew functions.** The crew uses only part of the control panel's capabilities during a training exercise. The following tasks are performed by the crew:

(a) Built-in test (BIT). The crew verifies the system is operational prior to, during, and after training.
(b) Alignment. The crew aligns the system to the tank prior to training.

Note. Hull ammunition in TWGSS contains the tank ammunition normally stored in hull and semi-ready rack.

(c) Upload of ammunition. The crew uploads ammunition from semi-ready rack to ready rack.
(d) Presentation of training result. The crew uses the control panel to receive firing results and, if fired upon, target results during training.

Note. Show Slide 45.

(3) **Control panel instructor functions.** The instructor accesses a special control panel menu through the CGUN transmission of a special access code. This menu allows the instructor to perform the following:

(a) Time adjustment. Time is manually be adjusted using the control panel.

Note. The ready rack is called turret ammunition in the control panel.

(b) Ready rack ammunition adjustments. The instructor adds or removes ammunition in the turret without the use of the TDRS computer unit.

Note. Hull ammunition in TWGSS contains the tank ammunition normally stored in hull and semi-ready rack

(c) Hull/semi-ready rack ammunition adjustments. The instructor adds or removes ammunition in the hull without the use of the TDRS computer unit.
(d) View position. The instructor can view the position of the vehicle to determine the position of a target during setup of a new gunnery scenario.

Note. Show Slide 46.

h. **System Cables.** The system uses two types of cable connectors. These are:

11-2. LECTURE/CONFERENCE/DEMONSTRATION (Con't).

(1) **Military standard (MS) connector.** This connector is mainly used for connections to the tank.

(2) **Push-pull connector.** This connector is normally used for connections within TWGSS.

Note. Show Slide 47.

i. **Control Gun (CGUN).**

(1) **CGUN features.**

(a) Rifle stock. This feature provides the user with support for long range shots.

(b) Laser transmitter. This eye-safe battery powered laser transmitter has a 2000 m range capacity.

(c) Scope. This 4X scope provides accuracy at long ranges.

Note. Show Slide 48.

(2) **CGUN messages.** The following information can be transmitted using the controller gun:

(a) KILL. This message is used by the instructor to kill vehicles.

(b) RESET. This message is used by the instructor to activate killed vehicles and allow them to continue training. RESET also restores ammunition load to the preprogrammed amount.

(c) TEST. This message is used by the instructor to verify that the TWGSS system is activated and functional.

(d) TIME MARK. This function is used by the instructor to time tag events.

(e) ENABLE CONTROL. This function enables the instructor to upload ammunition and reset systems during training without the use of the TDRS computer unit.

Note. Show Slide 49.

j. **Retro Reflector Unit.** The retro reflector unit is designed to be installed on panel targets and used for panel gunnery. They can also be installed on MILES-equipped vehicles to provide "cooperative MILES targets."

11-3. FINAL REVIEW. (5 minutes)

a. **Student Questions.**

Note. Show Slide 50.

b. **Summary of Main Teaching Points.**

(1) TWGSS components and their function
(2) Control Gun

Note. Show Slide 51.

c. **Closing Statement.** This block of instruction has provided the instructor an in-depth knowledge of TWGSS. The knowledge gained in this lesson will be of use when you to train soldiers in your unit.

APPENDIX A
TO LESSON PLAN 11

PRESENTATION OF EQUIPMENT

VIEWGRAPHS